What is claimed is:

1. An optical fiber probe comprising:

a near-field probe having a core transmitting light incident from an external light source and having a circular cone structure formed on an end of the core, and a cladding coated on a surface of the circular cone structure core to protect the core; and

a plurality of thin metal layers coated on the near-field probe, symmetrically disposed on opposite sides of the near-field probe, and spaced-apart from each other to generate an electrical potential difference.

2. The optical fiber probe of claim 1, wherein the thin metal layers is made of aluminum.

3. The optical fiber probe of claim 1, wherein the near-field probe is formed with a conductive layer coated thereon, and a portion of the conductive layer is removed by scanning a focused ion beam on the conductive layer to form the thin metal layers.

4. The optical fiber probe of claim 1, wherein the electrical potential difference is generated between the thin metal layers to allow light to pass through the near-field probe.

5. The optical fiber probe of claim 1, wherein the thin

metal layers are spaced-apart from each other by a distance according to at least one of a wavelength of light incident to the near-field probe and a characteristic of a material forming the thin metal layers.

6. The optical fiber probe of clam 5, wherein at least one of the thin metal layers comprises sides forming an angle of 60° with respect to a center of the near-field probe when the wavelength of the light is 400nm, and the material is aluminum.

7. The optical fiber probe of claim 5, wherein at least one of the thin metal layers comprises sides forming an angle of 90° with respect to a center of the near-field probe when the wavelength of the light is 650nm, and the material is silver.

8. An optical recording apparatus comprising:

a laser diode generating light;

an optical disc storing data using an optical signal;

an optical fiber transmitting the light emitted from the laser diode;

a near-field probe scanning laser beam on a recording medium by transmitting the light, which is incident from the laser diode, using a voltage potential difference therebetween; and

a lens condensing the light emitted from the laser diode to scan the light on the recording medium using the optical fiber;

wherein the near-field probe comprises a plurality of metal layers coated on opposite sides thereof and symmetrically spaced-apart from each other to generate an electrical potential difference.

9. An optical fiber probe used with an optical recording and/or reproducing apparatus, comprising:

an optical fiber having a core to transmit light incident from an external light source, and a cladding coated on a surface of the core to protect the core;

a near-field probe formed on one end of the optical fiber to emit the light transmitted through the optical fiber; and

a plurality of metal layers formed on the near-field probe and spaced-apart from each other by a distance to generate an electrical potential difference therebetween.

10. The optical fiber probe of claim 9, wherein the near-field probe comprises an opening formed on a distal end thereof, and the electrical potential difference increases a light transmission rate of the opening.

11. The optical fiber probe of claim 10, wherein an amount of the light transmitted through the opening is increased according to an increase of the light transmission rate.

12. The optical fiber probe of claim 10, wherein a diameter of the opening is smaller than a wavelength of the light passing through the opening.

13. The optical fiber probe of claim 9, wherein the near-field probe has a structure corresponding to a frustum of a cone, and the metal layers are formed on an outer circumferential surface of the structure.

14. The optical fiber probe of claim 13, wherein each of the metal layers has the same shape as a portion of the outer circumferential surface of the frustum of the cone.

15. The optical fiber probe of claim 13, wherein each of metal layers has two sides perpendicular to a center line of the near-field probe.

16. The optical fiber probe of claim 13, wherein each of metal layers has two sides parallel to each other.

17. The optical fiber probe of claim 13, wherein the metal layers have the same area.

18. The optical fiber probe of claim 9, wherein the metal layers comprises first and second conductive layers, the near-field

probe comprises a cone shaped structure extended from the core of the optical fiber, and the first and second conductive layers are formed to have a portion of the cone shaped structure of the near-field probe.

19. An optical recording and/or reproducing apparatus comprising:

a light source generating light;

an optical fiber having a core to transmit the light incident from the light source, and a cladding coated on a surface of the core to protect the core;

a near-field probe formed on one end of the optical fiber to emit the light transmitted through the optical fiber toward a recording medium; and

a plurality of metal layers formed on the near-field probe and spaced-apart from each other by a distance to generate an electrical potential difference therebetween.

20. The apparatus of claim 19, wherein the near-field probe comprises an opening formed on a distal end thereof, and the electrical potential difference increases a light transmission rate of the opening.

21. A method used with an optical recording and/or reproducing apparatus, the method comprising:

generating light from a light source;

transmitting the light through an optical fiber having a core and a cladding coated on a surface of the core to protect the core;

transmitting the light toward a recording medium through a near-field probe formed on one end of the optical fiber; and

generating an electrical potential difference using a plurality of metal layers formed on the near-field probe and spaced-apart from each other by a distance.